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RESTORING THE HISTORIC SCENE AT LINCOLN HOME

George L. Painter

Springfield, Illinois, was home to Abraham Lincoln for nearly 25 years. He moved to the city in 1837, married Mary Todd in 1842, and purchased the only home he ever owned two years later. Here, on the corner of Eighth and Jackson Streets, Lincoln enjoyed 17 years of family life before he became President. By 1860, the year he was nominated and elected to the Presidency, 9,400 people inhabited the thriving community. Like most of the city's residents, the Lincoln family had become well-acquainted with their neighbors and enjoyed friendships with many of them.

The National Park Service has preserved some of the neighbors' homes within the four blocks of Lincoln Home National Historic Site; others disappeared before the establishment of the Historic Site in 1972. In addition to the Lincoln Home, the Site contains seventeen historic structures, including twelve residences of Lincoln's neighbors. These houses and outbuildings are important resources because they compose an integral part of the historic scene surrounding the Lincoln Home.

In order to help preserve the historic structures, their interiors will be adapted for contemporary uses. The Historic Site is planning to lease approximately 10 houses for low-key business, commercial, or professional use. This can be done under the provisions of the 1980 amendments to the National Historic Preservation Act. As part of the program, the lessee must preserve, restore, and maintain the exterior of the structure during the term of the lease. In turn, the lessee will be permitted to adaptively restore the interior, subject to the restriction that major architectural features must be preserved.

In early 1985, the Site launched the program by announcing that the Corneau and Stuve Houses would be made available for leasing. From 1855 to 1860, the Corneau House was the residence of Lincoln's friend, pharmacist Charles Corneau. Historic records show that the Lincoln family purchased such items as "Cough Candy," "Caster Oil," and "Hair Balsam" at the Corneau and Diller drugstore. The Stuve House, on the other hand, was constructed more than ten years after Lincoln's departure from Springfield. The house has been preserved within the Historic Site as an excellent example of the Italianate style of architecture of the 1870's.

Prospective lessees of the Corneau and Stuve Houses received copies of requests for proposals. These packages described the architectural features of each structure, as well as the preservation requirements and tax incentives of the leasing program. Because the houses are included on the National Register of Historic Places, a corporation, group, or individual leasing a structure may take advantage of tax incentives. By the provisions of the Economic Recovery Tax Act of 1982, lessees who lease a certified historic structure for a minimum of 15 years and rehabilitate it for income-producing purposes may qualify for a tax credit of up to 25 percent of the rehabilitation funds expended.

The Site received leasing proposals from a number of parties. The Springfield Junior League has been selected to lease the Corneau House. The leasing of the Stuve House was under review as of this writing. Future plans include leasing approximately eight additional houses.

In another project related to the preservation and restoration of historic structures, the National Park Service is documenting the architecture of five Lincoln-period houses at the Site. The National Park Service's Midwest Regional Office and the Historic American Buildings Survey (HABS) in the Washington Office are jointly sponsoring the study.

The Site buildings under study by HABS include the Dean, Dubois, Miller, Sprigg, and Arnold Houses—structures named after their residents in 1860. Under professional direction, the research is being conducted by a team of student architects and graduate students in historic architecture. The project will document existing architectural conditions in each building through the preparation of photographs, field measurements, and measured drawings.

The HABS study was conducted during the summer of 1985. At its conclusion, the Historic Site and the National Park Service's Midwest Regional Office is to receive copies of the drawings. All original HABS records are transmitted to the Library of Congress for preservation. This research will lay the foundation for Historic Structure Reports, which will later provide recommendations on restoration of the houses.

In a related project, a historic paint analysis has been completed on the Beedle, Corneau, Lyon, and Sprigg Houses. To ascertain the colors of the four structures during the Lincoln period, a physical investigation was conducted in cooperation with the North Atlantic Historic Preservation Laboratory. The methodology of this study included such techniques as microscopic and chemical analysis. Under a contract, the houses are being painted in their historic colors.

During the early summer of 1985, the Service contracted for archeological excavations around four of the Site's historic structures, including the Lincoln Home. The Department of Anthropology of Northern Illinois University (NIU) conducted the field archeology as part of a contract administered by the Service's Midwest Archeological Center. Under the direction of Dr. Charles Markman and Floyd Mansberger of NIU, a crew of six project archeologists spent five weeks investigating areas adjacent to the Cook House, Shutt House, and Lincoln Home. Additional excavations will take place during the restoration of the Solomon Allen Barn foundation, which is scheduled for the autumn of 1985. NIU is researching the findings and performing laboratory analysis of the recovered artifacts.

A primary purpose of the archeological research is to survey areas which might be affected by future restoration projects. The excavations are also yielding additional insights into the lifestyles of the Lincoln family and their neighbors. Furthermore, these investigations have revealed new information about the physical features of the historic properties; for example, a well and cistern were uncovered behind the Lincoln Home. Such findings will help interpret the structural history of the houses and provide data for their restoration.

These projects all assist the NPS in its efforts to recapture the ambiance of the Eighth Street neighborhood Such restoration activities enable the public to view the Lincoln Home in its historic setting. This environment was an important part of Lincoln's life. During his 17 years in the Lincoln Home and nearly 25 years in Springfield, Lincoln's thoughts matured and his insights into the dilemmas facing the nation deepened.

On the morning of February 11, 1861, Lincoln completed preparations to depart from Springfield on the beginning of his fateful journey to the White House. About one thousand people had gathered in the drizzling rain to see him off at the great Western Depot. They called for a speech; from the rear platform of the train, Lincoln delivered his farewell address to the citizens of Springfield. Lincoln acknowledged the importance of these years when he declared, "To this place, and the kindness of these people, I owe everything." Then, the train pulled away and Abraham Lincoln left the place that had been his home for nearly 25 years. He was leaving Springfield to face formidable difficulties as President during the turbulent epoch of the Civil War.

The author is Historian at the Lincoln Home National Historic Site.

Volunteers Crucial in Custer Battlefield Dig

Warren E. "Sandy" Barnard

Ron Nichols is an engineer with a California-based aircraft manufacturer.

John Husk of Englewood, Colorado, is a consulting geologist who works for the oil industry.

Murray Kloberdanz practices law in Osage, Iowa. His brother, Mike, handles hospital computer supplies, based in Cedar Rapids, Iowa.

And Brian Pohanka is a writer–researcher for Time-Life Books in Washington, D.C.

All people of varying backgrounds. What brought them together—along with nearly 60 other men and women from 16 states and England—was the 1985 archeological project at the Custer Battlefield National Monument near Crow Agency, Montana.

All the volunteers provided from one to five weeks' service in the field, assisting archeologists from the National Park Service and the University of Nebraska in their search for clues as to what happened to Lt. Col. George Armstrong Custer and every man in five companies of his 7th U.S. Cavalry.

On June 25, 1876, Custer and some 210 men under his direct command were wiped out in a legendary encounter with Plains Indians recorded in history as the Battle of the Little Big Horn, better known as "Custer's Last Stand."

Almost 50 others died in a separate nearby engagement at what is today called the RenoBenteen Defense Site, where two of Custer's subordinates and nearly 350 men fought off the Indians for two days until relief parties arrived.

What actually happened to Custer and his men remains as much a mystery today as it was in 1876, but that doesn't keep history buffs from speculating. When a prairie fire swept across the main battlefield in August 1983, removing sagebrush and grasses that had gone undisturbed since the battle, Battlefield Supt. James V. Court realized that what was first viewed as a disaster actually offered an opportunity to peel away some of the unknown from the Custer battle storybook.

"One of my long-term goals since I came to the Custer Battlefield has been to have an archeological project, and the fire provided that opportunity," Court says.

So for five weeks in May and June 1984, archeologists and volunteers—many using metal detectors—searched the main battlefield, and uncovered more than 1,100 battle-related artifacts, including hundreds of cartridges and numerous pieces of bone material.

So successful was that initial project that the Custer Battlefield Historical and Museum Association, which had funded the first "dig", agreed to support a second one for May and June of 1985.

The second year's harvest of artifacts is still being studied, principally at the NPS Midwest Archeological Center in Lincoln, Nebraska. But Court and NPS Archeologist Doug Scott agree that this year's project was even more successful.

Some 3,100 artifacts, including a record 373 on May 21, the hottest day in the five weeks, were gathered by the professional archeologists and their troop of unpaid volunteers.

"We could not have done the project without the volunteers," Scott says.

For one thing, funds weren't available for hiring more experienced individuals. Perhaps more important, it would have taken much too long to train professional archeologists to handle metal detectors as skillfully as seasoned veterans Irwin and Riva Lee of Turlock, Calif.

The Lees spent all five weeks with Scott and company and directed the metal detecting at the Reno-Benteen site. The main battlefield itself had been swept a year ago.

Metal detecting hobbyists and archeologists mix about as well as gasoline and fire, but in two years at the Custer battlefield, a new appreciation has grown up between the two sides.

"My attitude has changed," Scott said. "We've learned that these people know what they are doing."

And they can be trusted with historical artifacts, Scott came to realize.

One metal detector pro, Val Gass, was asked by a television news reporter if he ever were tempted to steal artifacts.

Looking at her incredulously, he responded, "Heavens no, that's a part of history and it's exciting just to see these items coming out of the ground after 109 years."

It's also more important to allow the artifacts to be studied so that future generations can benefit from the knowledge, the retired railroad man from Salt Lake City, Utah, added.

No one went into either dig expecting to unravel the mystery of Custer's last fight, but the new information is already proving valuable.

"It appears likely that Custer was simply out-manned and out-gunned that day," Scott explains.

Archeologist Rich Fox, who made the first survey of the battlefield immediately after the 1983 fire, agrees, and notes that the "archeological database" should prove invaluable to historians for many years, long after initial studies are completed in the coming months.

Exploration of the Custer ground may not be finished, Court thinks. While additional metal detecting is unlikely in the future, several sites at Reno-Benteen are strong candidates for more traditional archeological study methods, he adds.

Perhaps the most disappointing aspect of the two digs was the failure to locate in Deep Ravine the remains of 28 missing men of Custer's Company E. Soil studies in the ravine by geomorphologist C. Vance Haynes of the University of Arizona were productive this year as he located what may have been the 1876 ravine floor.

Court wants more exploration conducted in Deep Ravine as well as around the 260 marble markers on the field. Twenty-six of the markers, which purportedly indicate where Custer's troopers died, were excavated under the direction of archeologist Melissa Connor during both years, and led to startling bone discoveries.

For example, this year some 150 bones of a Custer trooper were found around a marker on Greasy Grass Ridge. The bones of one leg were still inside his boot. So perhaps another archeological project may be undertaken at the Custer Battlefield.

The author is Assistant Professor of Journalism at Indiana State University, Terre Haute. As a battlefield volunteer, Barnard spent all five weeks of the project working as a media relations adviser.

MANAGING ORCHARDS—A DIFFICULT RESOURCE

John Donahue

John Muir National Historic Site, located in Martinez, California, was the home of the founding father of our nation's conservation movement. This nine-acre memorial was once part of Muir's twenty six hundred-acre fruit ranch. The grounds contain the Victorian mansion where Muir wrote most of his major works. The site also has a wide variety of orchards and a vineyard which help recreate the historic scene reminiscent of the "John of the Mountains" residence in Martinez. The plantings provide an econiche for many creatures and native vegetation as well as creating the ambiance that visitors find so memorable.

Our site is small in acreage, but rich in its diversity of species and the associated problems. Caring for a variety of species obviously requires a sophisticated management approach. Developing a plan for the management of any orchard is a difficult task at best. A National Park site usually has the added burden of having the orchards zoned as historic and categorized as a cultural resource. Facing the paradox of caring for a living, growing community of creatures, while maintaining the historic scene, can test the patience of the best manager. Add to the rigorous standards of cultural resource management, restrictions on the use of pesticides and the innate problems of historical landscaping, and you have the situation faced by our staff two years ago. Even the University of California, land grant college in the agricultural center of the world, did not have a document detailing the daily operations of orchard management. This dilemma has recently been overcome by the completion of our Orchard Management Plan and our site-specific Integrated Pest Management Plan.

The John Muir NHS Orchard Management Plan encompasses the rehabilitation and replacement of problem species. It also outlines the day-to-day grounds operations in a systematic manner. An important aspect of our strategy is the limited dependence on chemicals for pest management that we have chosen. We have developed an Integrated Pest Management plan based on organic methods. Emphasis is placed on deterrence, early recognition, biological controls, and cultural practices. Implementation of our cultural program includes a strict regime of irrigation, pruning, fertilization, harvesting and monitoring. These activities promote vigorous and healthy plants which can resist insects and diseases more effectively. There are, of course, no methods for predicting every form of blight or infestation that may occur. Many problems, however, can be anticipated and prevented with good management practices. The basic recipe which we used to assemble our plan included the following elements: selecting of goals; identifying the problems and existing inadequacies; researching the literature; establishing a network of professional contacts; selecting the best procedures for the operation; and enacting the plan, testing each segment in a field situation.

The selection of our goals was a simple matter. We wanted to establish the general needs that apply to all orchards and the specific problems and requirements of each individual species. Lastly, we wanted to organize our program along a calendar year outline. With our goals firmly established, we began identifying our problems by establishing an intricate system of monitoring both insects and diseases in our orchards. Reliable data was collected through the use of pheromone traps for specific problems, and yellow sticky traps for random sampling. Follow-up was provided through the use of visual observation which is labor intensive, but it provides essential information in a timely manner. These monitoring activities identify the problems, establish the population levels, and provide invaluable information about the patterns associated with each specific problem. Placing all of this data on graphs (generated by the Lotus 1-2-3 software package) revealed important information about population fluctuations and approximate dates of appearance. An original inventory of our orchards and an intensive search of the literature provided us with a framework to begin

building our program. Knowing what to look for and generally when it might appear helped us make the best use of our limited resources.

It rapidly became obvious that our problems were numerous. The results of our research also pointed out the failure of the previously used chemical program. Most chemical programs fall into the pitfall of treating the symptoms and not the problems. Our new program concentrates on the production of healthy trees with the expectation that they will be better able to defend themselves from attacks by insects and pathogens.

At this point, our network of professional contacts helped us gain reaffirmation of our own conclusions and an introduction to state-of-the-art techniques. We had established contact with universities, extension agencies, commercial growers, and research groups during our quest for answers. During 1984 we worked with the University of California at Berkeley division of biological control, and several divisions at the Davis campus. Entomologists, pomologists, viticulturists, and horticulturists traveled from various parts of California to offer advice. Rodale Press donated a considerable amount of literature. Each specialist was able to provide us with threads of knowledge which we wove into our own plan.

During the last two years, we have experimented with all of the methods included in our plans. We are convinced that our activities have increased the vigor of our orchard trees and established a balanced eco-system containing many predatory insects. Healthy trees in the field are the cornerstone of our pest management strategy.

Our successes in the last two years have been greater than we had hoped. Fireblight has been reduced from a 100% infestation in the pear orchard to being found in only one tree. This year's crop is also dramatically larger. Last year's apricots were insect-ridden about 50% of the time. This year our apricots have not produced a single worm. The codling moth population has been reduced from epidemic proportions in our apple orchard to an acceptable level. Apple trees that produced nothing of value recently are now presenting us with sweet, worm-free apples. Powdery mildew has been eradicated from our peach orchard. Peach leaf curl has been reduced significantly. Our greatest success has been the obvious increased vigor of our trees. Specimens that were ready for removal not long ago are now thriving and growing at an excellent rate. Our choice of the "healthier plant-more resistance" theory proved to be wise. In a world where the staggering expense of pesticide programs is compounded by their danger, it is enlightening to observe the success of our fairly innocuous approach.

In conclusion, the best way to battle the confusing problems associated with managing historic NPS orchards is to have a systematic general management plan and a site-specific Integrated Pest Management plan. The research, experimentation, and enactment of these plans have resulted in an overall positive effect on our grounds at the John Muir home. The orchards themselves have validated our management approach by their improved appearance and increased production of quality fruit.

The cultural practices at John Muir include:

Irrigation—soil moisture monitored with tensiometers watering by either deep root or flooding;

Fertilization—one pound of nitrogen per tree, stressed trees receive two pounds in two treatments- organic matter is constantly added to the soil;

Pruning—fruit trees are very different in their specific pruning needs, as detailed in the OMP;

Monitoring—pheromone traps for codling moth, peach borer, Medfly yellow sticky traps, and visual observation;

Sanitation—the key to any program effectiveness is to remove all diseased or infested material;

Biological Controls—trichogramma wasps have been used to battle codling moths without killing beneficial ladybugs, lacewings, etc.; and

Spraying Program—the use of mainly dormant oil containing COCS to help in the battle with fungi and mildew.

The author is the gardener at John Muir National Historic Site.

TO TOUCH OR NOT TO TOUCH

Bill Binnewies

Historic buildings and other structures have a strange habit of showing up anywhere within the National Park System. At Bighorn Canyon National Recreation Area, we have 42 historic structures which represent a significant cultural resource for this part of the country. However, because the primary purpose of our park is related to water-based recreation, cultural and other resources often do not receive the attention they need to provide for their protection and preservation.

We recognize the necessity for a systematic preventive maintenance program for our historic structures. Therefore, with help from the Rocky Mountain Region, we are developing a Historic Structures Preservation Guide (HSPG) per NPS-28. The plan is based on a documented inspection system from which we will identify the work to be done.

Now enters one of management's dilemmas. Once work on historic structures has been identified, who is going to do the work? To touch or not to touch, that is the question.

Our Cultural Resource Management Guidelines (NPS-28) requires that all maintenance work on historic structures be done by qualified technicians, artisans, or trade mechanics in accordance with an approved Historic Structure Preservation Guide or under the direction of a historical architect. However, because of the magnitude of the workload many parks, including those with significant cultural resources, do not have preservation guides or ready access to a historical architect. As a result, basic preventive maintenance which should be done by the park is not being accomplished because of a lack of "qualified" technicians needed to do the work.

We have skilled craftsmen at parks who are equipped with both the knowledge and skills to perform masonry, carpentry, painting, and other work. However, few have had any exposure to the standards related to historic preservation work. Because of limited training, a potential exists for compromising historic fabric while, for example, fixing a leak on a roof. Training opportunities for park employees in basic historic preservation maintenance are available, but limited.

Currently, the following training options are available:

1. Have employees attend Maintenance: Historic Structures for Technicians which is given twice a year (once each at Mather and Albright), or Maintenance: Cultural Resources for Managers, which is given once a year at Mather, or Preservation of Log Structures (usually given in the Rocky Mountain Region).
2. Have employees assigned on a temporary duty basis to a crew which is doing preservation or stabilization work (there are travel and other costs considerations with this approach).
3. Arrange for a historical architect to visit a park for hands-on training.
4. Watch for other agency or organization training opportunities.

Presently, special training programs in historic preservation maintenance are being conducted by some regions. Some are ad-hoc training given to park staffs as opportunities occur. Others are more formal training programs, as found in the North Atlantic Region, which leads to certification of park employees as Historic Preservation Maintenance Specialists.

The National Park Service needs to develop a historic preservation maintenance program which will lead to certification of employees as preservation maintenance specialists. Without such a program, management cannot execute an on-site preventive maintenance effort and still meet standards established in NPS-28. Such a program will benefit the employee, the park, and the resources, and provide for a much needed link among historical architects, archeologists, management, preservation specialists, and others.

The author is Superintendent of Bighorn Canyon National Recreation Area.

A SOLUTION TO FORT PULASKI'S PRESERVATION DILEMMA

Donald R. Cumberland, Jr.

Imagine you have to preserve a massive historic structure and thousands of museum objects in a climate known for its harmful effects on cultural materials. Compound this situation with the fact that the only available storage space is separated from a damp environment by only a wooden floor. No problem, you say? Well, the complications don't stop there. Upon closer examination, it becomes clear that the requirements and conditions necessary to preserve the museum objects may cause damage to the historic structure. If you were in this situation, how would you have resolved the dilemma of mutually incompatible preservation requirements?

This was the situation that Superintendent Daniel Brown at Fort Pulaski had to overcome in order to preserve the park's cultural resources. Faced with these perplexing problems, Superintendent Brown requested the assistance of the Southeast Regional Office and the Curatorial Services Branch, WASO. (See related article on Page 7 by John Beck.)

Fort Pulaski, a 19th-century brick coastal fortification, was built near Savannah, Georgia, at a location of strategic importance. Unfortunately, marshy terrain characterized the area, and the fort is surrounded by a watered moat. Efforts over many years to prevent moisture seepage into the lower portions of the fort have proved unsuccessful. Permanent dampness of the substories beneath the floors of several casemates, in fact, have become a way of life. Nevertheless, it is in one of these brick vaulted casemates that, faced with limited space, the park located the museum storage facility.

The climatic conditions at Fort Pulaski reflect the southern seacoast environment. High relative humidity, high temperature, and salt-laden air are typical conditions. These are the same conditions that also contribute to chemical, physical, and biological deterioration of artifacts. Altering such an environment so that it falls within limits beneficial to museum objects becomes a major challenge, especially considering the close proximity of the damp substory. The museum field recognizes and recommends maintaining certain levels of environmental conditions to minimize the deteriorating effects of temperature, relative humidity, light and pollutants. Two of the most damaging agents to artifacts are excessive, fluctuating temperature and relative humidity (RH) levels. Although specific types of materials may require different optimum levels of these two factors, the 16 degrees C to 24 degrees C (60-75 degrees F) range for temperature, and the 50+ - 5% range for RH are considered acceptable for most museum objects, providing the RH is kept relatively constant within this range.

Having established requirements for preserving the museum collection, let us turn our attention to the historic structure. For the last few years, historical architects have been concerned about the temperature and relative humidity ranges recommended for museum collections within historic structures. They feel that in some structures these conditions may not be compatible with optimum conditions for the survival of the historic structure. For instance, during the winter season there is a point where warmer, more humid air, being maintained to preserve museum objects inside the structure, contacts building fabric cooled by the colder ambient air outside the structure. At this point of contrasting temperatures the dewpoint of the humid interior air is reached and condensation occurs on the interior surfaces of windows, walls, ceilings, and floors. Depending on the humidity/temperature relationship, the dewpoint can also occur inside the historic wall. If condensed moisture soaks into the fabric of the structure, decay can threaten structural features. Another problem occurs if moisture reacts to a freeze/thaw cycle. The cycle of ice-crystal formation and thaw will weaken the fabric of masonry or stone structural features and cause the surfaces to spall or flake.

In spite of these conflicting preservation requirements, the park was provided a solution that contributed to the preservation of the historic objects without damaging the historic structure. With the assistance of WASO and the regional office, the park assembled a prefabricated self-contained modular structure within the historic casemate for use as a special museum storage room. This room, which is similar to a walk-in refrigerator, is built with a system of prefabricated modular foam panels four inches thick sandwiched between sheets of galvanized steel. These panels maintain strict temperature and relative humidity levels. Because of its superior insulation value and effective sealing capabilities, a structure made of these panels and fitted with a climate-control system becomes an environmental "vault."

The prefabricated museum storage room at Fort Pulaski measures 13'6" wide by 20'2l/2" deep by 10'6" high. It provides sufficient space to house the park's collections and the necessary storage equipment for containing them. After considering the strength of the casemate's wooden floor structure to carry a new floor load, the storage room was assembled inside the casemate. The storage room was designed with sliding doors and no windows. Walls, ceilings and floors were constructed of the prefabricated modular panels.

This storage room, with its environmental control system, provides the appropriate temperature and relative humidity conditions to preserve the park's museum collections; yet it keeps these conditions from affecting and damaging the historic casemate surrounding it. Damage is prevented because the contrasting temperatures that would cause dewpoint and condensation are reached in the moisture-free polyurethane of the vault panel instead of the fabric of the historic structure. In this way, the conditions needed to preserve the fabric of the fort can be maintained and so can the conditions necessary for the preservation of the museum collection.

The use of such structures for museum storage is a recent development. Only within the past seven years have museums made use of this type of system. The National Museum of American History, Smithsonian Institution, decided on one to store its archives. The staff at the Smithsonian's National Air and Space Museum found this system to be the only acceptable storage containment for the astronauts' space suits and other garments.

Such a system is considered by many museums to be state-of-the-art in collection storage. Whereas facilities using conventional structures may be capable of maintaining conditions appropriate to artifact preservation, the vault achieves the same results at a much reduced operating and capital cost. It is currently being handled under the Federal Supply Schedule. As a result of government contracting, the price is approximately 50% of the regular list price. The 1985 cost is approximately $35-40 per square foot, generally well below the cost required for a traditionally constructed building, and yet the panelized structure is more effective in preserving museum collections.

Two further benefits of this system are the ease of expansion and design change it permits as well as the rapidity of construction. It can be enlarged or decreased in size, or even moved at a later time with equal ease.

Currently, the park is working with a heating, ventilating, and air conditioning contractor as well as the regional staff to design a system for controlling the environment within the vault. The climate control system will maintain desired conditions independent of the other rooms of Fort Pulaski. The park plans to use a combination heating/cooling system such as a heat pump devoted exclusively to the storage area.

Within the Service, the adaptive use of historic structures for collection storage occurs frequently and will in all likelihood increase. If the routine use of a panelized inner box to contain collections can be promoted, needless damage to structures may be prevented, and optimum conditions for museum objects may be achieved. In this way, Fort Pulaski's preservation dilemma can become a preservation solution shared by other parks.

The author is Museum Specialist, Curatorial Services Branch, WASO, stationed at Harpers Ferry Center. (The installation and use of this prefabricated structure for museum

storage together with technical information, will be the subject of a Preservation Tech Note, to be featured in a future CRM BULLETIN.)

Fort Pulaski's Bally Box—A Superintendent's Point of View

John Beck

At many of the smaller units of the National Park System, improvements in cultural resources management have come slowly—or perhaps not at all. This situation almost could have been predicted with the coming of shrinking budgets and field generalization, as well as the priorities and legal precedent given to other park operations. Finally, in the 1960s, the Service began to give its sizable artifact collection the proper documentation and storage it deserved. The first step at Fort Pulaski National Monument was to provide appropriate storage for approximately 1,800 artifacts in a harsh subtropical maritime climate. As a joint project, the Curatorial Services Branch staff at Harpers Ferry Center, the National Park Service Southeast Cultural Resource Center in Atlanta, and the staff at the monument purchased and installed a Bally building in the fort. Normally used for the storage of fruit or other perishable foods, it proved to be a relatively inexpensive, efficient, and effective solution. At once, the level of care for the monument's study collection and archives improved significantly.

First, museum storage was consolidated. In the late 1960s, planning documents recommended moving all modern operations into the newly constructed visitor center. At the same time, park staff documented that office and storage space designed in the visitor center was already inadequate. By 1980, museum storage consisted of more than half a dozen locations in three buildings scattered throughout the monument. By pursuing adaptive use along with the Bally building, museum storage was easily consolidated in a room of the fort, adjacent to the visitor services and resource management staff that would care for the collection.

In addition to well-ordered storage, the Bally building with its insulation factor of R32 provided a remarkably stable and efficient environment for whatever it contains. The primary objective of the improved museum storage was to minimize deterioration from heat, cold, moisture, light, dust, air pollution, insects, rodents, and fungus. There is no question that we have achieved that objective while at the same time we have improved intrusion and fire protection. Today, our study collection is sealed in a virtually airtight, watertight box discreetly placed within a historic structure. If we chose to move the storage facility into the next room, the park staff could do the job in a few days and replicate the same standards of care found in the previous location. This degree of flexibility would be difficult to achieve using other approaches to study collection storage.

Basically, the Bally storage vault looks like a large galvanized box with a water-cooled heat pump sitting on top. For a structure of its size and function, it is so self-contained that there is virtually no adverse impact on the historic fort itself. The visual or audio intrusion is minimal to nonexistent; therefore, the box provides an excellent approach to adaptive use of historic structures. In addition, fire and intrusion alarms are not needed because the fort, as an exhibit, is already protected by these devices. Constructing the building was very simple. It was shipped in several pieces after being specially built to our specifications, and put together using half a dozen employees who had never assembled one before. The park's maintenance division wired the interior with track lighting for maximum flexibility. Shelves and cabinets were assembled in a few days, and the building was ready for artifacts and archives. With its high insulation coefficient, maintaining a proper temperature and humidity also required only a minimum-sized heat pump.

What is the next step at Fort Pulaski National Monument? Having acquired a near perfect storage facility for the study collection, a multitude of our problems have been solved. In 1985, the staff hopes to complete all required paperwork for museum accreditation by the American Association of Museums. A few years ago, the goal was well beyond reach, primarily due to a storage situation far below standard. Now Fort Pulaski

National Monument can look toward recognition as a leading NPS museum accredited by the AAM. Through experience, we have learned that the Bally building—or any structure with its attributes—is probably the first and easiest step toward such a goal that a museum manager can make. Considering the tremendous improvement in care afforded the study collection, we believe the Bally box was a very wise investment.

John Beck is the Chief of Visitor Services at Fort Pulaski.

Warships In The Pacific—A Theme Study

Dr. Harry A. Butowsky

Have you ever wondered what happened to the large fleet of warships that the United States used in World War II to defeat the Japanese in the Pacific? Where are the dozens of aircraft carriers, battleships and cruisers that formed the backbone of the American fleet? What about the hundreds of destroyers, submarines and fleet support ships used in the war?

To find the answers to these questions and also identify other sites associated with the victory over Japan in World War II, the Congress of the United States, by means of Public Law 95-348, asked the National Park Service to evaluate surviving World War II warships that saw action in the Pacific against Japan and to provide a basis for recommending certain ones for designation as National Historic Landmarks.

During this study more than 40 surviving warships and merchantmen dating from World War II were identified and visited. Twenty-five of these were found likely to meet the criteria of the National Historic Landmarks Program. A twenty-sixth ship, USS Missouri, is discussed because it is listed on the National Register of Historic Places.

The American battle fleet that fought against Japan in World War II was made up of many types of ships, each performing her specialized mission and supporting general fleet operations. The battle fleet in the Pacific provided an attack capability that destroyed Japan's warships and merchant marine and spearheaded the amphibious attacks that threatened the home islands with invasion. The success of the fleet was dependent upon the successful operation of its many component ships, each performing a specialized mission to accomplish the overall objective of defeating Japan. Included in the study are aircraft carriers, battleships, cruisers, destroyers, submarines, minesweepers, and a number of other types such as Liberty Ships, and PT Boats.

Aircraft Carriers

USS Intrepid and USS Yorktown are Essex class aircraft carriers that fought against Japan in World War II and represent the role and power of the aircraft carrier as the principal capital ship of the Navy after 1941. The Pacific War against Japan was fought over vast reaches of ocean employing aircraft carriers as highly mobile weapons capable of destroying enemy ships and bases at great distances. Japan's success early in the war and that of the United States later in the conflict was directly dependent on the achievements of the carrier battle-groups deployed by each side. Essex class carriers represent the determination and industrial potential of the United States to achieve victory in World War II. Both ships have been altered from their World War II configuration with the addition of angled flight decks. They are in good condition and are preserved as museum ships.

Battleships

USS North Carolina, USS Alabama, USS Massachusetts and USS Missouri represent the World War II role of the American battleship which changed from the principal capital ship of the Navy to a support ship designed to protect and screen the fast Essex class carrier battlegroups.

USS North Carolina, USS Alabama, and USS Massachusetts were all fast new American battleships that illustrate the role of the battleship as the protector of the aircraft carrier. USS North Carolina and USS Alabama are in excellent condition and retain their World War II integrity. USS Massachusetts is in good condition and retains he] World War II integrity. All three ships saw action in the Pacific during World War II.

USS Missouri is perhaps the most famous American battleship dating from the war. It was on her deck on September 2, 1945, that the Japanese signed the surrender ending World War II. For many years she was in reserve in the Navy Yard at Bremerton,

Washington. In 1983 the Navy moved her from Bremerton to T Beach, California, to prepare the ship for active duty. As a result of her modernization, USS Missouri has lost her World War II integrity.

Cruisers

By 1942 cruisers had become the principal surface combat ship in the Pacific. In addition to screening the fast attack carriers, cruisers carried out gunnery raids on enemy-held shores, provided fire support for amphibious operations and were given many assignments in support of general fleet operations. Of the many existing types and classes of American cruisers that fought in the Pacific none has survived unaltered today. USS Des Moines is the culmination of wartime cruiser development. She is the first of a class of ships designed to effectively compete against Japanese cruisers in World War II. Although she was not commissioned until after the end of the war, her design concept and equipment date from the war. She represents one of the last big gun wartime cruisers in existence today. She is still retained by the Navy in the reserve fleet at the Philadelphia Naval Yard.

Destroyers

Destroyers in World War II were general all purpose ships ready to fight off attacks from the air, on the surface, or from below the sea.

Fletcher class destroyers are particularly significant and played a major role in the defeat of Japan in the Pacific. They were the first to break with design practices that had developed as a result of the London Treaty of 1930. They were large ships that carried sufficient food, fuel, ammunition and stores for extended operations in the Pacific. With 175 built, Fletcher class destroyers were the largest class of destroyers constructed by the United States in World War II. USS Kidd, USS Cassin Young, and USS The Sullivans are all Fletcher class destroyers. USS Kidd is in excellent condition and retains her World War II integrity. USS Cassin Young and USS The Sullivans are in good condition and retain most of their World War II integrity.

USS Laffey, an Alan M. Sumner class destroyer, was an interim design between the Fletcher class and the much improved Gearing class. USS Laffey is particularly significant because of her action on April 16, 1945, when she fought one of the most famous destroyer-kamikaze duels of the Pacific War. In the space of 90 minutes she was attacked by 22 Japanese kamikazes and bombers. During this action USS Laffey managed to shoot down 11 of the attacking planes while being hit by five kamikazes and two bombs killing 32 and wounding 71 of her crew. USS Laffey was awarded a Presidential Unit Citation for this action. USS Laffey is the only Alan M. Sumner class destroyer surviving today in the United States. She is in fair condition and has lost some of her World War II integrity.

USS Joseph P. Kennedy Jr., a Gearing class destroyer, was a late World War II design and represents the ultimate development in World War II destroyer design. USS Joseph P. Kennedy, Jr. is in good condition and, although modernized, retains much of her World War II integrity. She is the only surviving Gearing class destroyer today in the United States.

Submarines

The role of American submarines in the war against Japan cannot be overestimated. During four years of war, American submarines sank more than 600,000 tons of Japanese warships and more than 5,000,000 tons of merchant shipping. This was accomplished by a force that never numbered more than two percent of naval personnel engaged in the war. American submarines formed a blockade that denied Japan the oil, food, and other raw materials she needed to continue to fight. By 1945, without this commerce and the raw materials it supplied to her war effort, Japan found it impossible to continue the war outside of the homeland.

The Gato class was the standard design for American submarines at the beginning of World War II. The Gato class, and its successor, the Balao class, bore the brunt of the

fighting against Japan during the war. Gato class submarines were successful boats that proved to be fast, strong, well armed, and suited to the long-range patrols necessary to fight in the Pacific. USS Silversides, USS Drum, USS Cobia, and USS Cod are all Gato class submarines. USS Silversides and USS Drum are in excellent condition, retain their World War II integrity, and have significant war records. USS Cobia is in excellent condition, retains her World War II integrity, and saw service in the Pacific during the war. USS Cod is in good condition, retains her World War II integrity, and saw service in the Pacific during the war. USS Cod is the only World War II submarine preserved as a war memorial that has not been altered to accommodate visitor access. Visitors to USS Cod must enter the submarine the same way the sailors did in World War II.

Balao class submarines were an improved version of the previous Gato class. They were designed to dive to a depth of 400 feet as opposed to the 300 feet for Gato class boats. Like Gato class submarines they were built in large numbers and carried much of the burden of the submarine war in the Pacific. USS Bowfin, USS Pampanito, USS Lionfish, and USS Becuna are all Balao class submarines. USS Bowfin and USS Pampanito are in excellent condition, retain their World War II integrity, and have significant war records. USS Lionfish is in excellent condition, retains her World War II integrity, and saw service in the Pacific. USS Becuna is in good condition, has some loss of her World War II integrity, and saw service in the Pacific.

USS Torsk is the only surviving Tench class submarine that saw service in the Pacific. Tench class boats were improved copies of the previous Gato/Balao classes and represent the final submarine design of World War II. USS Torsk is particularly significant in that she fired the last torpedoes of World War II and is credited with sinking the last Japanese combat ships to be lost in the war. USS Torsk is in good condition with some loss of her World War II integrity.

Minesweepers

USS Hazard and USS Inaugural are fleet minesweepers of the Admirable class that represent the role of the many support ships designed to service and protect larger naval vessels in operation against Japan in World War II. The purpose of fleet minesweepers was to arrive before the main battle fleet and sweep the area for mines. Minesweepers remained with the fleet during operations constantly sweeping for enemy mines. Minesweepers were the first navy vessels to arrive in a new area and the last to leave.

USS Hazard is one of the best preserved and maintained World War II warships in the country today. She was taken out of operation in 1946 and has survived as a museum ship in Omaha with all of her systems and equipment intact. She possesses total integrity and is a time capsule of a World War II-era Navy minesweeper. USS Hazard served in the Pacific in 1945.

USS Inaugural is in fair condition and has lost a substantial amount of her World War II integrity. She is now restored to her World War II configuration. She served in the Pacific in 1945.

Torpedo Boats

PT 796 is a Higgins-type torpedo boat built for service in World War II. PT Boats were small, fast, and ultimately expendable interdiction ships, armed with torpedoes and machine guns for cutting enemy communication lines, for harassing enemy forces, and for short-range oceanic scouting. PT Boats were a significant American naval warship type in World War II and were

responsible for numerous enemy losses in warships, material, and personnel. PT 796 is the best remaining example of this type of warship in the country today. She is in excellent condition and retains her World War II integrity.

Liberty Ships

Liberty Ships were an emergency response to a critical shortage of maritime cargo ships in World War II. Manned by merchant seamen and a naval armed guard, they carried all types of war supplies throughout the Pacific and Atlantic Oceans. More than 2,700 Liberty Ships were constructed during the war. They were all built to a standardized design and represent the unexcelled industrial capacity of the United States to prepare and transport war supplies all over the world during the war. Liberty Ships were armed for defense and many of them participated in combat with enemy forces.

SS Jeremiah O'Brien is the sole operable unaltered survivor of this great fleet of ships built during the war. She represents the largest class of ships constructed by the United States during the war. SS Jeremiah O'Brien is in excellent condition and retains her World War II integrity.

The author is a historian in the History Division, WASO.